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63rd Annual Report

AGRICULTURAL PROGRESS

Through Research

W. B. KEMP, Director
Experiment Station

Station Bulletin A-62

July 1, 1949—June 30, 1950

MARYLAND AGRICULTURAL EXPERIMENT STATION
UNIVERSITY OF MARYLAND • COLLEGE PARK, MARYLAND

Experimental agricultural research in Maryland is designed to help Maryland people do a more productive and efficient job of producing agricultural products. Frequently it takes research workers many years of intensive study to solve agricultural problems, but they are constantly contributing to better living—one of the primary objectives of life.

The benefits of agricultural research are no longer confined to rural Maryland. They are becoming of increasing importance to urban dwellers of which Maryland has many. Much of the Experiment Station's work on fruit and vegetable crops, floriculture, lawns, and gardens can and is being used by those living in urban areas.

The Experiment Station gratefully acknowledges the assistance and cooperation of the many public, private, and industrial organizations, and individuals in helping to apply science to agriculture's problems. The Maryland Agricultural Experiment Station will continue to use its time, effort and funds to the best possible advantage in the never-ending search for more and better agricultural information. Research leads the way to agricultural progress.

W. B. KEMP,
Director

To the Governor of Maryland, the Board of Regents, and the President of the University of Maryland

I transmit herewith the Sixty-Third Annual Report of the University of Maryland Agricultural Experiment Station, as established by Act of Congress, March 2, 1887, containing an account of research and experiments conducted during the fiscal year ending June 30, 1950, and a statement of the receipts and disbursements for the same period.

W. B. KEMP,
Director

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Agricultural Economics

INSURANCE

FARMING has always been considered a hazardous occupation. From past experiences it is possible to predict fairly accurately the fire and accident hazards against which farmers need protection. Agricultural economists surveyed 333 farmers in 19 counties in Maryland and learned that: 61 percent of the farmers used life insurance to provide security for their dependents; only 10 percent had any type of accident insurance; farmers are carrying more hospitalization insurance as time progresses, but the insurance does not reach the people who need it the most; approximately 85 percent had liability insurance on farm trucks and automobiles; only seven farmers out of the 333 interviewed had any liability insurance on hired help; and about 94 percent of the farmers had fire insurance, but farm property was covered up to only 47 percent of replacement costs.

These results indicate several deficiencies in the farm insurance programs. Farmers can reduce considerably the seriousness of some risks in farming by the use of proper amount and kind of insurance.

SOCIAL SECURITY

Two hundred and sixty-eight Maryland farmers were interviewed concerning their attitudes and opinions on the controversial subject of social security for farmers. Financial status appeared to be the most important factor influencing farmers' attitudes toward extending the program to farmers. Approximately 56 percent of those interviewed were in favor of a social security program for farmers and 60 percent in favor of a program for farm laborers.

RURAL ROADS

Agricultural economists have been studying the local rural roads to get much basic information that is needed to estimate needs and the methods of financing their construction by Federal, state and local governments. The large volume of commodities transported, and the large number of vehicles and persons travelling on local rural roads demonstrates the tremendous need for more and better roads in rural Maryland.

Roads also seem to be increasing in importance in determining farm real

estate tax assessments. In three counties studied the average assessment per acre ranged from 35 to 90 percent higher for farms on hard-surfaced roads than for farms on dirt roads. Assessments applied to tillable land bordering hard surfaced roads ranged from 20 to 65 percent over the assessment of such land along dirt roads.

Improved rural roads are an asset to farmers marketing their products and in obtaining production supplies. They also provide a better basis for more social contacts in the rural communities. The approximately $450 per mile allocation of state highway user taxes for county roads does not provide appreciable amounts for improving the county roads after maintenance of the system is taken care of. Thus, for most counties, some other financial plan is necessary if a rapid improvement of the local dirt road status is contemplated. By appraising the road conditions and needs in relation to road responsibility and tax resources, the various units of government are in a better position to formulate and finance local rural road programs.

TAXES

Farm real estate assessment increased an average of 20 percent since 1936. Increased tax rates, however, resulted in tax levy increases of 75 percent. Farm personal property assessments have also increased up to more than 200 percent. The major portion of farm real estate assessment changes since 1936 concerns the assessment of farm buildings. Increases in farm building assessments since 1936 range from about 25 percent to 120 percent among the counties. Most of the increase occurred during the last 5-year assessment rotation. The policy of using 1944 levels of values as a basis for assessing, beginning in 1949, also had a tendency to increase building assessments.

PRODUCTION

Broilers: Itemized out-of-pocket costs of broiler production were as follows: feed, 75 percent; chicks, 17.7 percent; fuel, 2.6 percent; and other costs, 4.7 percent. Factors which are most likely to influence unit costs are feed efficiency, mortality, age and weight when sold, and price received.

Broilers can be produced about $40 per thousand birds cheaper in the summer than in other seasons of the year primarily because of a lower feed requirement. However, chick placements have been considerably lower during the summer months for the 8 years prior to 1950 than in any other season of the year, primarily because of a shortage of hatching eggs and competition for labor from other farm enterprises that time of year.

The most profitable weight to market broilers, both from the standpoint of unit cost and profit, is at 3 to 3¼ pounds per bird.

Milk: A study of the factors affecting seasonal milk production as compared to uniform milk production indicates that the farmers who were producing fluid milk in a uniform flow throughout the year were getting greater returns for their effort. They were getting higher production per

cow and had a higher total output. Year around feeding and milking practices on farms producing a uniform flow of milk were superior to those practices followed by seasonal producers.

MARKETING

Eggs: Agricultural economists learned in a study of factors effecting egg quality that the level of egg quality is much lower in the summer months than it is at any other time of the year. Producers find it difficult to maintain high quality in the summer months because of high temperatures, and because other farm enterprises are competing for labor. Producers of high quality eggs received an average of 5 cents per dozen premium for their eggs. The additional monetary cost incurred in maintaining high quality eggs is relatively small. The greatest cost involved is the additional time necessary for gathering eggs more frequently.

Sweet corn: The rapid transition of the sugar in sweet corn to starch after the corn has been pulled creates a serious marketing problem for farmers.

Two methods of marketing designed to preserve the original sugar content of the corn, "hydro-cooling" and "night harvesting," have been analyzed in terms of relative costs and results. The latter phase involved wholesale and retail investigations and the use of a consumer taste panel. Results are still preliminary, but indicate that lack of appreciation or "education" on the part of distributors and consumers tends to keep premiums too low to cover the additional costs involved in preserving the sugar content. If all parties concerned could be "educated" to the entire process necessary to maintain this quality, the annual farm income from this product could be increased several fold as a result of increased volume of sales.

Peaches: The damage and resultant loss to producers in the process of marketing peaches is tremendous. Investigators at the Experiment Station divided the peach marketing process into six major operations to determine where and to what extent these damages and losses occur. The six operations were picking; hauling from orchard and unloading at the packing house; brushing, grading and sizing; packing, wholesaling, and retailing.

It was learned that the most serious bruising occurred after the peaches were packed in the conventional bushel basket. The rate of bruising increased rapidly at the wholesale and retail levels of marketing. In most cases the highest rate of bruising occurred immediately after packing. However, rough handling was observed in all operations. Pickers with long finger nails and the use of slatted field crates were the primary causes of cuts. The rim and lid of the bushel basket were responsible for some cuts.

All factors have not been analyzed, but more work is being done on the perplexing problem of marketing high quality peaches.

Sweet potatoes: Sweet potato producers on the Eastern Shore have been experiencing difficulty in marketing all of the crop. Potatoes from that area were found to contain a high percentage of grade defects at the shipping point, which indicates that much of the injury occurs either on the farm or at the packing shed. The principal types of defects found were cuts, bruises and growth cracks, all of which are the result of improper

harvesting and packing practices or improper grading. Eastern Shore producers can compete more successfully with other areas if they do a more careful job of grading, and if they improve their harvesting and handling practices.

White potatoes: Consumer taste tests were conducted to determine whether or not consumers were able to discriminate between the potatoes produced in Maryland and those produced in competing areas. Forty-two percent of those tested preferred a new variety produced in Maryland, but the potato was not competing successfully with other potatoes on the retailer's shelves. Several tests concerning the effect of handling and grading methods on sales were conducted in retail stores. The results indicated clearly that consumers' preference for potatoes from competing areas was not based on actual differences in tastes, but it was due to the superior quality of potato being marketed. Eastern Shore potato producers could overcome much of this competition and expand their market considerably by improving their harvesting and handling procedures and by doing a more careful job of grading.

Cantaloupes: Maryland cantaloupe producers have also experienced competition from other areas in the United States, particularly from the West where pre-cooling and icing practices have made it possible to place high quality, vine-ripened cantaloupes on eastern markets. Research workers are working on the problem of how to increase consumer demand for Maryland cantaloupes. It was learned that consumers judge cantaloupes largely on the basis of outside appearances when they purchase them at the store and upon sweetness (percent soluble solids) when they eat them; that cantaloupes with less than 8 percent soluble solids are not acceptable to consumers; that consumers are willing to pay a premium if they can be sure of getting good quality cantaloupes, regardless of the location where they were grown; and that Western-grown cantaloupes, which are on the market concurrently with Maryland cantaloupes, were consistently sweeter than Maryland cantaloupes.

Past practices of producers making fewer pickings over a wider range of maturity has resulted in a pack with poor appearance, particularly with respect to uniformity of size, color, and general appearance. More frequent pickings with closer supervision during picking time, by allowing only full-slip melons to be picked to insure the maximum weight and sweetness, should materially help Maryland producers enlarge their market at premium prices.

Experiments are now being conducted to ascertain the feasibility and desirability of placing labels on individual cantaloupes to distinguish various categories of quality. Consumers may soon be able to buy cantaloupes without fear of getting a poor quality melon.

Fruit and vegetable spoilage losses: Economists learned that: (1) Waste and spoilage losses for fresh produce handled in retail stores was 4.1 percent of the volume handled in the spring and summer and 5.8 percent in the winter months. Losses were heavier in the winter because produce moved more slowly during the cool months. (2) Loss rates were lower in larger stores because of better handling and more adequate refrigeration facilities. (3) Mechanically refrigerated produce racks were the most effective means of handling produce. Proper ordering and good care given fresh fruits and vegetables resulted in low losses in stores using unrefrigerated display cases.

Considerable information on consumer shopping habits was collected. It was learned that consumers were

exceedingly price and quality conscious when it came to buying fresh produce.

Pricing Policies: Retailers who made most use of the policy of "markdown" or price reduction to move the supply of produce on hand incurred less loss than those who did not reduce prices. Produce sold in prepackaged or consumer size units incurred approximately one-half as much loss as the same item sold in fresh bulk form. Also, there was no significant difference in the rate of spoilage and wastage between produce grown in Maryland and in competing areas.

More work on this problem is being done. However, application of the results gotten so far should help retailers do a more efficient job of purchasing and pricing their produce.

OTHER STUDIES

Agricultural economists are also studying the economic aspects of prepackaging fresh fruits and vegetables, father and son partnership arrangements, prices paid by farmers, factors affecting the efficiency of milk production, and the economics of soil conservation farming.

Agricultural Engineering

AGRICULTURAL ENGINEERS have continued their work to reduce the cost of drying baled hay with heated air. Approximately 225 tons of hay were dried from an average moisture content of 45 percent at an average fuel cost of $4.75 per ton. This is a reduction of 40.7 percent over the costs 1 year ago and 60.4 percent over the costs 2 years ago. Proper field handling and efficient loading of the drier are essential for economy in drying baled hay. Present costs seem reasonable in view of the improved quality obtained by drying.

Increased value of the hay is shown by higher carotene and protein contents and by more favorable fat-fibre ratios as determined by chemical analysis. Feeding trials are being conducted to determine the relative value of this hay, as compared with field cured hay, in the dairy ration. A survey on the operation and performance of all types of barn hay driers in the State is in progress.

Equipment is being set up to determine the possibilities of drying ear corn with unheated air under Maryland climatic conditions.

TOBACCO

A tobacco spearing machine that can be operated by two men was developed in the agricultural engineering shops. It is hoped that this machine will eliminate some of the hand labor involved in spearing tobacco. A tobacco stick sharpener as developed by Kentucky was tested. After extensive tests were made, it was determined that sharpening sticks with the sharpener was 2½ times faster than sharpening by hand. The sticks sharpened by the machine also have a uniform taper which is nearly impossible to get with hand sharpening.

Studies on hanging tobacco mechanically are in the preliminary phases. Angle iron racks have been constructed and electric hoists have been installed in the test tobacco barn at the Maryland tobacco experimental farm. Much more study is needed on this phase of tobacco work.

Some work has been done with the use of supplemental heat and forced air to control the curing during humid weather. Very good conditions were maintained by changing the air in the test barn approximately every 10 minutes and raising the temperature between 5° and 10°F. Additional tests are being planned.

OTHER STUDIES

A high clearance, self-propelled machine, designed and built by the agricultural engineers is being remodeled to apply concentrated, liquid insecticides to corn. It has a 9-foot clearance and will be used to get data on the entomological phases of corn insect control.

Figure 1. An aerial view of the front of the University of Maryland Plant Research farm near Fairland

Agronomy

PASTURE AND HAY CROPS

Red Clover

Improvement: Researchers in Agronomy report that Shawn, a strain of red cover which has been maintained in Queen Anne's County, Maryland for many years, proved to be the heaviest yielder in terms of 12 percent moisture hay. Strain and variety evaluation tests were made on 7 varieties in 1949 in which Shawn ranked first, Kenland, second and Bayne third. The agronomists call attention to the fact that Kenland is the only variety available in large quantity and, therefore, will be the principal recommendation for farmers to use.

Management of young stands: In an attempt to learn some of the answers and to improve the management practices on red clover stands, agronomists set up a project in which 16 different combinations of management treatments were used on seedling stands. Various dates for cutting, variation in the number of times cut, and removal versus leaving cut growth and straw on the seeding were some of the management practices used.

Yields from the first year of trials show that straw should be removed after combining and the growth should be cut and removed during August or early September. The better the treatment, the better the yield; in fact, the plots that were mowed within a week after combining and, with all the straw and plant growth removed, followed by a second mowing for hay in late August averaged almost twice the yields as in the areas where no treatment was given. It is estimated that the rec-

ommendations made from the results of this study will increase the hay yields in Maryland at least 25,000 tons during 1950.

Mowing and removing stubble in July of the seedling year controlled weeds, especially ragweed, gave a good crop of weed and stubble-free clover to cut in early September, and helped to maintain good stands. Eight to ten plants per square foot appears to be the optimum stand. Thinner stands result in more weeds, and thicker stands result in smaller and weaker plants and lower hay yields.

Grazing red clover seedlings is a good practice in maintaining stands if the grazing is not excessive.

Many red clover stands are not fertilized adequately, resulting in weak growth and unhealthy plants. Top dressing with 300 to 600 pounds per acre of an 0-12-12 or 0-14-7 will improve the health and vigor of the plants.

The agronomists are working hard to find ways to improve the forage crops for pasture, hay and grass silage in Maryland. In one phase of this study, plants from 18 strains of red clover that survived artificial inoculations of *Colletotrichum trifolii* (Southern Anthracnose) were tested. Infections with *sclerotinia trifoliorum* were also made in the 1949-1950 test. Seedlings that survived both are to be space planted for field testing, selection, and seed production next year. Hand pollinations will be made using the most vigorous plants remaining from the 194 planting and also the plants transplanted to in the spring of 1950.

Using Kenland red clover as a base, the Stevens, Morris, and Sanford strains resisted Southern Ahtracnose most successfully. Another strain, Oland, appeared to have the least resistance.

Alfalfa

Improvement: In alfalfa strain and variety evaluation tests, in which 10 varieties are being studied, Atlantic and Buffalo were generally superior in 2 harvest years' results. Yields of Grimm and Argentine alfalfa were somewhat lower than other varieties.

FIELD CROPS

Dent Corn Hybrids

Since 1937 the total corn acreage planted to hybrid varieties has increased from 0.5 percent to 91.5 percent. No state east of Ohio uses corn hybrids more intensively. Much of this progress can be credited to the sound recommendations made by agronomy researchers at the University of Maryland Agricultural Experiment Station. Good hybrids have consistently outyielded the best adapted pollinated varieties at least 15 to 25 percent. There has not been so much lodging as was frequently found in the open pollinated varieties. Agronomists will continue to search for higher-yielding and more satisfactory corn hybrids.

Wheat

Over a 3-year period leaf rust resistant selections of wheat, USDA 2381, 2652, and 2375 have been at the top in yield tests. In 1949, twenty-four varieties and three mixed populations were compared in plots. USDA 2381 had the best appearance and yielded 35.2 bushels per acre. It was selected from a Leapland X Frontera cross and resembles Leapland, a well established Maryland variety. Because of its promise it is being increased for farm use.

Barley

In hydridization tests for smooth awn barley, Natural Selection 6625, a hybrid composite, has compared well

for 2 years with the best varieties available. However, Wong continues to be the leading variety in Maryland, but is giving some concern because it is susceptible to brown loose smut.

Soybeans

The work in 1949 on soybean production in Maryland was limited to testing 15 varieties. Eleven of them that had been in the series of tests during past years were tested again along with four new varieties, namely Wabash, Hawkeye, S100, and Monroe. S100, with a yield of 34.3 bushels per acre in 1949, is a Missouri selection from the variety Illini. It is in the maturity group with the old Haberlandt and Hollybrook varieties. In general, the late varieties made the highest yields.

Sweet Corn

Work has continued on the breeding and seed production of sweet corn varieties. Several new inbred lines, notably Md. 533.1, are now ready for commercial use. Four experimental hybrids are now being compared in uniform tests by several northeastern states. It is estimated that at least 75 percent of the sweet corn acreaged in the State is planted in accordance with the findings of this project.

Fertilizer

In a study on the influence of various fertilizer ratios on the yields of wheat, corn, and hay in a 3-year rotation, the variation in phosphoric acid and potash applications has had little influence on the yields. Nitrogen seems to give the greatest response in all three crops. The usual rotations and fertilizer practices do not make the best use of nature's way of maintaining a satisfactory supply of nitrogen. Therefore, most of our crops will respond to higher nitrogen fertilizers than are being used.

In another experiment in which comparisons were made between the availability of phosphorus from various phosphate carriers, wheat produced an average of 16 bushels on plots that had been phosphated with rock phosphate; on plots where superphosphate, calcium metaphosphate, potassium metaphosphate and fused rock phosphate were used the wheat averaged between 21 and 23 bushels per acre. However, there seems to be no apparent effect on the yields of corn.

Lime

In a study of the lime needs and reactions in Maryland soils, a rapid method for more accurate estimation of the amounts of lime needed has been developed. Studies on the depth of penetration of lime into the soil, pH values, and exchangeable calcium and magnesium determination will be continued.

Researchers are also trying to determine the relative agricultural values of by-product liming materials in eastern Maryland. Results indicate that as long as there is plenty of calcium and magnesium in the soil and the soil reaction is near 6.5, most any form of liming material will be satisfactory. Apparently the type of material is not too important as long as there is sufficient calcium and magnesium to raise the pH to the proper crop preference level and supply enough of ions to meet the crop needs. However, much more remains to be done before any definite recommendations can be made.

PASTURE RENOVATION

Assuming that livestock and dairy farmers in the State are constantly in need for more and better pastures the agronomists have started a very com-

prehensive program on pasture renovation. The primary objective is to determine the best method of getting a productive, tall-growing pasture mixture on existing sods where it is not desirable to resort to extensive land preparation or a rotation system. This is especially important where the land is rolling and subject to severe erosion.

The main variables include fall versus spring establishment and disking versus shallow plowing to set back or kill existing sods. Disking in the spring has been markedly inferior to shallow plowing in suppresssing the existing Kentucky bluegrass or orchard grass sods. However, disking previous to August seedings compares favorably with shallow plowing. Mixtures on late summer-disked plots gave as high annual yields during the first harvest year as those planted on the plots that were shallow-plowed before the August seedings. Disking in the spring resulted in a slight disadvantage for the first-year yields in comparison with spring plowing. These studies will be continued.

Research workers are also testing improved tall-growing pasture mixtures such as orchard grass, tall fescue or brome grass with ladino clover and other legumes. These grasses are much more productive and withstand the hot dry weather better during the summer months than the low-growing grasses such as bluegrass. Pasture mixtures such as orchard grass and ladino clover are proving to be very good in both the rotation system and the renovation pasture program.

Complete records were taken for 690 pastures on 350 farms during 1949 on the past and present management and fertilizer practices. The data will be used to help evaluate and develop a more productive pasture program for Maryland farms.

TOBACCO

Rate of Fertilization

Agronomists have been studying the effect of the placement of fertilizers on tobacco. Several experiments were conducted in which 800 pounds of 4-8-12 was used. Listing 400 pounds under the row and broadcasting 400 pounds was the best combination of treatments. This type of treatment resulted in reduced mortality of transplants, more uniform maturity, highest yields per acre and high quality as compared with 800 pounds listed under the row or broadcast.

With treatments using 1600 pounds per acre of 4-8-12, the best results were gotten where 400 pounds was listed under the row and 1200 pounds sidedressed at the time of first cultivation. The lowest mortality count, most uniform maturity, second highest yield and highest quality were obtained with this treatment. It was exceeded in yield only by a treatment of 800 pounds listed under the row and 800 pounds sidedressed. This treatment resulted in 1406 pounds of tobacco per acre as compared with 1113 pounds in the former treatment. However, the treatment with only 400 pounds of fertilizer under the plants, produced 54 percent bright crop as compared with 34 percent for 800 pounds under the plants.

A 1600 pound rate gave the highest economic return, estimated at $657 per acre, compared with $500 per acre for an 800-pound application. Rates above 1600 pounds per acre were not profitable; in fact, yields were reduced.

In the same study the application of the various elements were divided. For example, the best all around result was obtained when the phosphorus was put under the row, all the

nitrogen and half the potash side-dressed at the first cultivation and the balance of the potash applied 45 days after planting.

Seedbed Management

A new project was recently initiated to study the control of weed and soil diseases, the fertilizer requirements, the use of manure and other organic supplements, the relative merits of fall and spring treatments of a chemical nature on weeds, and the growth of the tobacco seedling.

SEED INSPECTION

More than 3,600 samples of various types of seeds were submitted to the Seed Laboratory during the calendar year of 1949. This was the largest number of samples ever sent to the laboratory. Seeds were tested for purity analysis, noxious weed content, germination rate, identification and many other similar qualities.

More than 300 samples of tagged seed samples were tested during the year. These samples were examined for the kind of seed, percentage of pure seed, other crop seeds, inert matter, noxious weeds, and the percentage of germination. Vegetable seeds were examined for the kind of seed and the percentage of germination.

OTHER STUDIES

Agronomists also worked on the chemical and physical changes in the soil by the formation of the organic colloidal complex, the effects of various short rotations on the physical, chemical, and pathological conditions in the soil and on crop production, soil moisture variations as influenced by vegetation, control of weeds in corn with 2, 4-D, and hydrologic studies with reference to soil moisture conservation, soil fertility and flood control. The efficiency of soil fertility management, reclassification of soils and the adaptation of these classes to soil conservation work in Maryland, and the influence of treatment of fertility level and crop response in Maryland soils, were also studied.

Animal Husbandry

SWINE

THE LINE OF SWINE that is being developed in cooperation with the USDA and Blakeford Farms, Inc., farrowed 23 spring and 14 fall litters in 1949. Feed and slaughter data indicate that the Landrace X Berkshire line cuts out more pounds of ham, bacon, total yield of 5 primal cuts, and cutting fat per carcass than the Yorkshire. The Yorkshire yielded more back fat and more total fat than the Landrace X Berkshire line. No significant differences between sire groups in carcass yields were found in the new line. Two farmer herds of the new line were established during the year. About 35 head were sold from Blakeford Farms for breeding purposes, some of them going to the corn belt area.

Two lots of eight pigs each were put on the Connecticut Broiler Ration (a ration that has proved highly successful in the broiler industry) to determine what effect it would have on pigs. Another two lots of eight pigs each were put on a good, standard control ration. There were no statistically significant differences between the rations in economy of gain or rate of gain. The use of the higher priced Connecticut Broiler Ration is not necessary for pigs if they are given an adequate ration containing protein from animal sources.

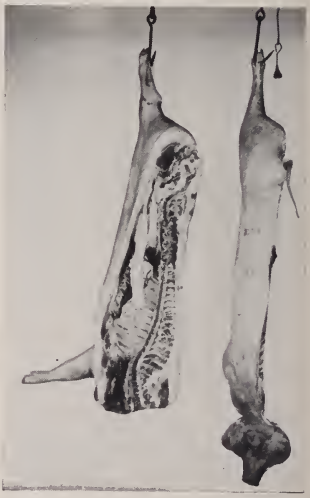

Figure 3. The five primal cuts on this hog, (same hog as in Figure 2) based on live weight amounted to 52.4 percent. The right ham weighed 16.07 pounds of which 14.05 were edible. It dressed out 79.45 percent, cold carcass weight. Note the uniformity of back fat. It weighed 220 pounds at slaughter.

Figure 2. A side and rear view of a typical 5/8 Landrace—3/8 Berkshire line of swine. Note the length, depth and uniformity of body, width and depth of ham and lack of wastiness about the jowl. See Figure 3 for a view of the carcass.

BEEF CATTLE

Results based on one year's work indicate that beef calves may be weaned at 90 days of age instead of 6-7 months without any adverse effects. Twelve calves were weaned at 90 days and 11 at 180 days; all 12 of the first group and 4 of the 11 calves were individually fed from weaning to one year of age. There were no statistically significant differences in weight between the groups at birth, 90, or 180 days or in gain from birth to 90 days or from birth to 180 days, but the calves weaned at 6 months did gain more rapidly than the others from 90-180 days. There was no apparent differences in health, vigor, finish, or type between the two groups at one year of age.

Type classification studies were made by scoring 498 beef cattle, 217 of them twice, located in five different herds in the State. Statistically significant differences were found in scores between judges, seasons, and herds. Some problems connected with type classification were discovered. More work seems to be necessary on the matters of standardizing judge's opinions, correcting for the condition of the animal, seasonal influences, and evaluation of the records.

The bloating of beef cattle grazing improved pastures, particularly pastures containing a large percentage of ladino clover, has become a serious problem on many Maryland farms. Little is known as to the exact cause of this bloating or as to the various factors which make the problem more acute on one farm than on another. A survey of conditions has been made and work will continue in an attempt to find answers to the problems.

SHEEP

It is estimated that at least one ewe out of 50 to 60 in farm flocks is lost annually from ketosis or pregnancy disease. Attempts to produce ketosis experimentally in the purebred Hampshire and Southdown flocks at the University were unsuccessful. Because Hampshire and Southdown ewes come into estrus only in the fall and produce lambs only in the winter and spring, ketosis studies to date have been limited to one season of the year. Twenty crossbred Dorset-Delaine ewe lambs which will breed either in the spring or fall were purchased in 1949. This will enable animal husbandmen to study the disease during two seasons of the year.

OTHER STUDIES

Studies continue on the factors influencing the production of high quality pork products. A method of regional injection is being used in an effort to provide a product of top quality. A study on the development of the testes of the ram indicated that, on the basis of the work to date, Hampshire ram lambs seem to produce sperm cells at an earlier age than Southdown rams. Ram lambs should be separated from the ewe flock before an age of 20 weeks to prevent accidental fertilizations.

Animal Pathology

VETERINARIANS in the Animal Pathology Department are testing the efficiency of various chemicals and drugs against Blackhead, an infectious disease of turkeys. Vioform continues to exhibit preventive action against both artificially and naturally induced Blackhead. Chloroxyquinoline possesses preventive action against a high mortality rate in artificially induced blackhead, but fails to exhibit preventive action against even a relatively low mortality rate in naturally induced Blackhead.

Included in plans for the coming year are tests of several new drugs, graded doses of present effective drugs.

Newcastle

Field trials were carried on in immunization against Newcastle disease with inactivated and modified virus vaccines. High grade immunizing value was demonstrated in 6-week old chickens in trials with embryo-propagated hamster-modified Newcastle disease virus (California No. 11914).

The immunity response was greater when the vaccine was injected into the base of the wattle than when administered by the stick or wing bob procedure. Studies of other phases of the vaccination field, including rapidity of development of immunity and the duration of the resistance, will continue.

Ketosis

The veterinarians are exploring the possible role of various organic acids of dietary and metabolic origin such as oxalic, citric, and some of the fatty acids with respect to their significance in causing milk fever and ketosis (acetonemia). Citric acid which is produced in quantity by the udder does not appear to be an important factor. Free fatty acids appear to be markedly increased in the parturient cow, and may hold the key to these disturbances, but further work is needed. So far it has not been demonstrated that oxalic acid is produced in increased quantities at parturition.

Control methods recommended for bovine mastitis continue to show that the disease can be controlled within the barn and the herd, provided there is a desire to do so. Work in 30 dairy herds throughout the State show that these methods are practical as well as effective. Dairymen have been shown that it is not necessary to treat (by udder infusion) every animal that shows symptoms of mastitis. Aureomycin has been given a trial and found to be about 50 percent effective in treating infectious mastitis as compared to 94 percent claimed by

the manufacturer. Penicillin is about 95 percent effective, but it is being used somewhat promiscuously.

Dairymen report that there is little or no expenditure for therapeutic materials for the treatment of mastitis where a control program has been established and continued.

Complement—Fixation Test

In order to evaluate the complement-fixation test for anaplasmosis, a study was made of the results obtained from the tests applied to blood samples collected from a large number of herds in Maryland. After eliminating many herds, blood samples were drawn from animals in 10 herds and subjected to the complement-fixation test. Then the blood from the negative animals was pooled and inoculated into splenectomized calves. Samples from the suspicious animals were also pooled and inoculated. Individual samples from positive reacting cows were inoculated in test calves.

From a group of nine calves inoculated with blood from nine cows that reacted positively to the test, seven calves developed anaplasmosis. Ten calves inoculated with pooled blood from animals negative to the test failed to develop anaplasmosis. The test looks promising.

Work continued on calfhood vaccination against Bang's disease.

Botany

IN THE PAST, commercial varieties of peppers have shown considerable undesirable genetic variation and have not been suitable for the production of uniform hybrids. By treating haploid peppers with colchicine, plant scientists have gotten some 30 different "doubled" haploid lines. Since doubled haploids are entirely homozygous and uniform, a doubled haploid line having desirable fruit and plant characters would be a valuable contribution not only as a commercial variety but as a parental line in the production of hybrid seed. Two of these "doubled" haploids show considerable promise. While these investigations are of immediate practical application they are also yielding very important information in certain phases of theoretical botany.

POTATOES

Studies of disease resistance, adaptability and quality of old and new potato varieties and seedlings were continued. During the 1949 season, 34 potato varieties and 16 seedlings were under observation. This project has resulted in the adoption of the following varieties by the majority of Maryland potato growers: Katahdin, Sebago, Pontiac and Kennebec. The use of the Irish Cobbler is the only potato variety now extensively grown in Maryland that has not resulted from this project. As soon as sufficient seed becomes available more growers will plant the new blight- and scab-resistant varieties that are adapted to their conditions.

A spraying experiment was conducted at Oakland to determine the relative merits of Bordeaux mixture plus DDT, and DDT alone. Fourteen varieties were included; the time of planting and cultural practices were indentical. Yields were recorded from Kennebec, Seneca, Placid and seedling B69-16 where no Bordeaux mixture was used. These varieties were all very resistant to late blight, which was very severe on susceptible varieties. All resistant and susceptible varieties yielded more in the plot sprayed with Bordeaux plus DDT than in the unsprayed plot. Results indicate that with varieties very resistant to late blight, a change in the spray schedule may be possible which will reduce costs.

Experiments were conducted on the Eastern Shore to determine the value of various hormones and chemicals in breaking the rest period of potatoes. The objectives were to hasten the sprouting and prevent the rotting of early potatoes being used for seed for the late potato crop. The mixture of protectants with the chemicals used to hasten the sprouting did not prevent the seed pieces from rotting, and did not increase the

stand. Results indicate that it will be practical to use early grown seed for planting the late crop on the Eastern Shore. However, before the practice becomes general, it will be necessary to find a white-fleshed variety that responds to the treatment as well as Marygold which has yellow flesh and may never be grown commercially or extensively. Tests with new chemicals and protectants will be continued.

SWEET POTATOES

Various diseases have seriously affected the commercial production of sweet potatoes in Maryland. It was found in field tests on several standard varieties for difference in susceptibility to various diseases that Maryland Golden, Big Stem Jersey and Nancy Gold are more susceptible to pox than Jersey Orange, Little Stem Jersey or Nancy Hall. There are several types of rot affecting sweet potatoes: black rot, soft rot, end rot, dry rot and storage rot. Between 30 and 40 percent of sweet potatoes harvested rot before they are marketed. Field work on control of the black rot disease was conducted in cooperation with a grower whose crop was severely affected by this disease. Root treatment and sprout dips resulted in only moderate field infection, but about 50 percent of this crop was lost due to black rot when stored.

In an experiment designed to control storage rots, freshly dug roots were washed and stored in containers in a partial atmosphere of a chlorinated benzene mold inhibitor. The roots remained normal in appearance until in May, but were so saturated with the vapor that they were inedible. The technique holds no promise as a means of storing sweet potatoes, but may prove to be a valuable means of storing specimens for study or demonstration.

The use of Puratized Agriculture Spray has greatly reduced the amount of scurf and fusarium wilt when properly used by growers.

STRAWBERRIES

Plant scientists discovered that there are at least two strains of the organism causing the disease known as red stele. The Temple variety which has proved to be resistant to red stele in previous tests is susceptible to the new strain. This new strain is not economically important yet, but it could easily become so One variety from Scotland is resistant to the new strain but susceptible to the old strain. The discovery of a second strain of the organism greatly complicates breeding work being done with strawberries for resistance to this disease.

SWEET CORN

The fundamental nature of the "delayed-action browing" of injured sweet corn kernels has been further investigated. Scientists believe it is an enzymatic action whereby the proteins are broken down to amino acids. Then the amino acids and the sugar in the corn react in boiling water to form a brown kernel if the kernel has been damaged previously.

Dairy

KETOSIS

DAIRY SCIENTISTS continued their work with ketosis (often called acetonemia). They are not able to propose the cause and cure for ketosis which annually takes a heavy toll in the dairy industry. The new discovery that ketosis is caused by improper functioning of adrenal and pituitary glands is a very important step in the long job of learning how to overcome this dread disease. Cortisone, a new miracle drug, is being used to cure ketosis. It is a hormone which was synthesized for the first time in 1946. Several cows at the Experiment Station with ketosis were treated with Cortisone and recovered in a very short time. Within 10 hours after an injection of Cortisone, the sick cows started to eat and drink, and within 18 hours after treatment they had a ravenous appetite and appeared to be completely recovered. Milk flow returned to normal within 3 to 6 days.

FAT METABOLISM OF MAMMARY GLAND

A heart-lung perfusion apparatus was built and a number of studies have been carried out in the perused mammary gland. An experiment was also conducted on the inter-relationships between milk production and fat intake, heat increment, and blood liquid fractions. The benefits from the fat intake studies may be considerable, but all the data have not been analyzed as yet.

HEAT TREATMENT OF MILK

Dairy scientists at the Experiment Station are studying the effect of heat treatment of milk on ammonia production, particularly as it affects the color and flavor of milk. Twenty percent cream, rennet-whey, and rennet-whey emulsified with mineral oil were used in the tests to determine the possible sources of ammonia. Results with 20% cream showed that the ammonia producing substances are in the skimmilk portion of milk, and that the protein of the fat globule membrane is an important source of ammonia. Ammonia production in rennet-whey was about two-thirds that of milk. The whey proteins and/or non-protein nitrogen of milk were found to be the major sources of ammonia. In heated milk the casein was a minor source of ammonia. Continued studies are planned related to the isolation, purification, and identification of compounds present in milk processed by high-temperature short-time procedures.

OTHER STUDIES

In a study of factors that affect the availability of nutrients in feeds and their influence on blood composition and milk secretion, tentative results indicate that alfalfa hay is a complete ration for milking cows, except for net energy.

Preliminary experiments were conducted on chicks to determine if the vitamin A destroying factor in soybeans is active in chickens as well as ruminants. The principal objective is to find a small animal or fowl that can be used in a study to determine why soybeans increase the vitamin A requirements of cattle.

Other studies include a project on the effectiveness and accuracy of different types of samples used in the testings of producer's milk for butterfat, and a study on the effect of feeding high energy diets during the freshening period.

Entomology

RESEARCH ENTOMOLOGISTS continued their study on corn borer populations and on levels of parastism. The level of corn borer populations in most parts of the State has decreased in the last 2 years, and the populations of parasites have increased. Experiments were carried out on the timing of sprays for controlling the corn borer. One year's observations indicate that insecticide applications made at about the time first silks appear on sweet corn give the best control of the corn borer. Insecticidal treatments recommended for ear worm control were more effective against the corn borer than recommended corn borer treatments. Since all pests of corn are apparently controlled, treatments for ear worm appear to be practical for the market gardener and economically feasible for the canner in southern and eastern Maryland.

AEROSOLS

Experiments were conducted on aerosol formulations suitable for use in the home garden and on formulations for controlling the Mexican bean beetle. Work on the garden aerosols is in the preliminary stage, but the results secured with 2% parathion aerosols on the Mexican bean beetle were extremely satisfactory. Parathion has proved to be much superior to pyrethrum or rotenone. One or two applications of 2% parathion aerosol gave nearly perfect control of the bean beetle, but his material is so dangerous that general recommendations cannot be made as yet.

Parathion and rotenone dusts and several aerosol formulations for controlling beetles on lima beans have been tested. Parathion preparations were the most effective in killing adult beetles, but beans dusted with rotenone, pyrethrum and synergist dust produced the heaviest yield of beans. There appears to be some detrimental effect of parathion on the setting of fruit.

Aerosol and dust treatments were also tried on pea aphids, but 1949 was a poor year for the development of pea aphids in Maryland. Pea aphids have not been a serious threat to Maryland producers for several years.

CODLING MOTH

Various materials were used on 16 plots of Stayman winesap apples in an effort to control the codling moth. DDT in a straight schedule or in a split schedule with lead arsenate, and parathion alone or in a split schedule all gave nearly 100 percent control of the codling moth in plots that had

been sprayed with DDT for the past 2 years.

The sprays schedules that were revised by entomologists and used by many Maryland apple growers resulted in an estimated 300,000 bushels more saleable apples valued at $500,000. An equal or greater amount of saving can be attributed to the control of the red-banded leaf roller.

PEACH BORER

Work continued on the control of the peach tree borer. Entomologists also continued their work on the study of controlling various types of insects that attack peach foliage and fruit. Fruit injured by insects varied from 14 percent on a plot treated with Meldrin up to 40 percent on plots treated with lead arsenate. By substituting benzene hexachloride for lead arsenate in the peach spray schedule, growers have been able to produce a greater tonnage of high quality fruit than was produced by the use of lead arsenate. Trees on the plots sprayed with benzene hexachloride made better growth, had more luxuriant foliage and larger fruit than trees on the plots sprayed with lead arsenate.

OTHER STUDIES

Entomologists also worked on methods to control the tobacco horn worm, cattle lice, mimosa webworm, and insects attacking orchids.

Horticulture

HORTICULTURAL RESEARCH WORKERS added several new varieties of peaches and apples to the experimental blocks during the past year. Several new varieties of peaches that were added 3 years ago fruited for the first time this year. Some of these new varieties have been established in two locations in western Maryland cooperatively with growers. The performance will be followed to learn whether or not they are commercially acceptable for Maryland growers.

Several thousand seedlings of raspberries are being tested in experimental plots. Two of the early red raspberry selections are now being propagated as rapidly as possible and will be named and released as soon as adequate stocks are built up. Both have shown greater resistance to winter injury under Maryland conditions compared with standard varieties.

Work continues with new and better strawberry and blackberry varieties. Some work is also being done with varieties of blueberries in western Maryland on a limited trial basis under upland soil conditions.

PROCESSED VEGETABLES

The job of determining and preserving quality, including nutritional values, palatability, and attractiveness in fresh and processed vegetables is a big one. Many instruments and devices are being and have been developed to make it possible to buy and sell vegetables on a quality basis. The work on instruments for asparagus, beans, and sweet corn has advanced to the point of limited commercial application. A new instrument combining the advantages of existing instruments for peas should be available for general use soon. Work with multiple-purpose pressure and color instruments will be continued on green, wax, and lima beans, peas, corn, and tomatoes.

Experiments show that higher total yields and quality are gotten with

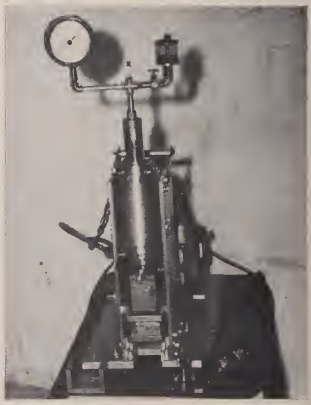

Figure 4. A multi-purpose shear-press for measuring quality of vegetables.

asparagus when the spears are harvested at a minimum length of 5 inches above the ground.

The corn borer continues to give commercial canners trouble. Studies indicate a real need for (1) better field control and (2) better methods of eliminating them at the cannery. Approximately half of the worms are eliminated on the sorting belt under current methods, but that is not enough.

APPLE QUALITY LOSSES

In a study on the factors affecting maturity, shipping, and storage quality of apples, it was discovered that the loss in quality in Richared Delicious apples during post-storage was much more pronounced at 55° than at 45°. Fifty degrees is the highest temperature at which apples should be stored after they have been taken out of cold storage. The loss of quality also was greater in those apples taken out of cold storage in January than in October or December.

MINERAL NUTRITION

The leaf has been shown to be the best indication of potassium nutritional status of the peach tree. Varying the potassium nutrition greatly affected the total accumulation but not the concentration of other elements in the tree. The peach tree responds to applications of potassium quickly and at any time.

Foliar sprays of urea were effective in increasing the nitrogen content and vigor of apple foilage, but no effect was obtained from similar sprays on peach foliage.

In nutritional studies with grapes, it was learned that spray applications of magnesium sulfate in July corrected a chlorosis of grape foliage within 6 weeks after application, but soil applications of the same material were ineffective in the same season.

SWEET POTATOES

Between 30 and 50 percent of the sweet potato crop on the Eastern Shore was lost in 1949 because of cracking. As a result of this enormous loss, a project was initiated to study the relationship of environmental and soil factors to the cracking of sweet potatoes.

CANTALOUPES

In the cantaloupe breeding and selection program, 64 field crosses were made during the 1949 crop season in an attempt to combine factors for resistance to defoliation with factors of high quality and good appearance. Work on this phase of the program will continue.

Two extensive field studies were made on a sandy loam soil to learn (1) the effect of various combinations of lime and fertilizer analyses at different rates of application, and (2) the effect of foliar application of nutrient elements on cantaloupes. Of 20 combinations of lime and fertilizers of

different analyses at varying rates, no significance could be attributed to most of the treatments in either yield or quality. The failure to show differences may have been due to the exceptionally low moisture supply during the growing season. The beneficial effect of borax was again demonstrated; an application of 10 pounds of borax per acre, as a top dressing 9 weeks after emergence, resulted in 9.7% soluble solids as compared with 8.6% from comparable treatment without the borax.

Three mineral salt treatments, borax, magnesium sulfate, and borax plus magnesium sulfate, applied as a foliar spray, resulted in significantly less defoliation, the leaves were much greener, and the harvest was delayed for about 5 days as compared with a Zineb check plot. These results are going to be applied during the next growing season on a commercial basis in an effort to reduce the amount of defoliation and increase the percent soluble solids in Maryland cantaloupes.

FLORICULTURE

Several phases of the study of ornamental plants that are "difficult to propagate" are under way. The results of the work with rhododendron cuttings suggests that the cortex tissue may inhibit rooting of cuttings. Nitrogen applied to the stock plant was found to have the most pronounced effect on rooting response of geranium cuttings.

The mineral nutrient requirements of the azaleas are being studied carefully. Present observations indicate a marked growth response to nitrogen fertilizers provided phosphorus and potassium are adequate. Deficiency symptoms caused by a lack of nitrogen, phosphorus, potash, calcium, magnesium, iron and boron are being observed.

Mineral nutrition for the hydrangea was studied. Nitrogen fertilization is necessary for flower formation. Contrary to commercial practice, flower bud initiation was not inhibited by a heavy fertilization late in the season, but rather there was a greater number of flowers produced. Excessive fertilization with phosphorus, which is commonly practiced to produce pink flowers, can result in a reduction of plant growth. Both nitrogen and potash are necessary for maximum growth during the forcing period.

Preliminary studies on the keeping qualities of cut flowers as influenced by packaging show that carnations and snapdragons treated before packaging with a 10 percent sucrose solution exhibited longer keeping qualities when removed from the package. Carnations kept at 31°F. can be kept as long as 6 weeks in a salable condition with a longer post-storage life than flowers stored at 45°F. for shorter periods of time.

Work is being done on the effects of environmental factors and cultural practices on the growth and flowering of hydrangeas and azaleas.

OTHER STUDIES

Yield and quality studies were continued with peas, tomatoes, watermelons, snap beans, cucumbers, and lettuce. One hundred forty-five field crosses were made with strains of tomatoes containing some resistance to defoliation and varieties and strains known to have desirable qualitative and quantitative characteristics. The breeding program is designed to alleviate the considerable losses suffered each year from fruit cracking and defoliation.

Poultry

NUTRITION

POULTRY RESEARCHERS have continued extensive studies on the nutritive requirements of poultry. A study was conducted to determine the vitamin B*12* requirements of New Hampshire pullets for hatchability of their eggs and "carry-over" of B*12* through the eggs to their progeny. Chicks from these dams required 5.5 micrograms of vitamin B*12* per pound of diet for rapid growth to four weeks. It was found that 1.8 micrograms of vitamin B*12* per pound of ration was adequate to support normal hatchability. Furthermore 3.6 micrograms per pound of maternal ration provided enough "carry-over" in the chick progeny to support normal growth to 4 weeks of age when only 1.3 micrograms of vitamin B*12* lb. was supplied in the chick ration.

Chicks from dams receiving no vitamin B*12* in their ration grew normally when 12.5 micrograms of B*12* per pound were added to the chick ration. Poor viability, poor feathering and slow growth characterized similar chicks not fed vitamin B*12*. Initial body weights of chicks were not affected by the level of vitamin B*12* in the maternal ration. Supplementing the maternal ration with liver meal, dried brewers' yeast and menhaden fish meal did not result in greater hatchability or "carry-over" in the chick progeny than was obtained with the addition of vitamin B*12* alone. These findings are directly applicable to ration formulation.

The increased use of high energy broiler rations has emphasized the need for determining the level of productive energy required to support rapid growth of chicks. Energy as well as other essential nutrients must be supplied in adequate amounts in practical poultry rations for best results. Productive energy values are available for all common poultry feedstuffs and may be used in the formulation of practical rations for broilers and poults. A level of 850 calories of productive energy per pound on 1100 calories per quart was found to be the minimum for rapid growth in N. Hampshire broilers to 8 weeks.

Studies with chicks and poults concerning unidentified growth factors have been continued. Evidence has been obtained to indicate that at least two such factors are involved, using both purified and practical type rations. Fish meal, liver meal, crab meal, and meat scrap appear to be good sources of one of these while dried whey, dried brewers' yeast, and butyl molasses solubles appear to contain the other.

During the past year, a new metabolic rate for vitamin B*12* has been revealed by studies with chicks. This vitamin has been found to effectively counteract the toxicity and growth depression which follows the feeding of large amounts (4%) of the amino acid, glycine. This finding suggests that vitamin B*12* is concerned with the metabolism of glycine in the chick.

Trials were run on the effect of decreasing thyroidal activity on feed efficiency. Thyroidal activity was

controlled by feeding 0.2 percent thiouracil in combination with 1gm./cwt. of thyroprotein. This treatment resulted in higher feed efficiency during moderated temperatures, but did not have the same effect when the birds were exposed to either high or low temperatures.

A series of five trials were run in which turkey poults were fed diets to which thyroprotein was added at levels varying from 5 to 60 gms./cwt. Results indicated that turkeys grow faster when the thyroidal activity is increased. Levels of thyroprotein that definitely depress growth of chickens may stimulate the growth of turkeys. The highest level used did not depress the growth rate of turkeys.

GENETICS

A genetic study was made on the inter-relationships among the thyroid gland, testes, and body growth which revealed that thyroid weight and body weight are directly correlated. In general it can be said that the more rapid gaining birds have more thyroidal activity.

Poultry researchers are also working on the effect of male and female sex hormones on rate of growth, feed efficiency, the effect of lowered thyroidal activity on feed efficiency between 8 and 12 weeks of age, and the effect of thyroidally active materials on the rate of growth of young chickens and turkeys. Pellets of male or female sex hormones were implanted into male and female chickens that were 8 weeks of age. The females treated with male sex hormones took on the appearance of males, while the males treated with female sex hormones took on the appearance of capons, yet, 5 weeks after treatment all groups were comparable in weight with control groups.

In semen studies with chickens and turkeys, work has been done on the effect of male sex hormone on the fertility of tom turkeys, and the effects of time and temperature of storage on the fertilizing capacity of chicken semen.

The fertility of approximately 6,000 turkey eggs laid by eight pens of 12 hens each has been determined. Only one tom was used at a time in each pen. Twenty-four toms have been tested. Half the toms were treated with a pellet of the male sex hormone testesterone. The fertility of the eggs from the hens with treated toms was somewhat higher than those from the control pens, but the difference is not great. The difference was most noticeable in the fall months.

In studies on the effects of time and temperature on storage on the fertilizing capacity of chicken semen, 60 hens were artificially inseminated with semen that had been held at different temperatures for varying periods of time. The optimum temperature for storing chicken semen is between 10° and 20°C. At temperatures above or below this range, the fertilizing capacity of the semen was quickly destroyed.

In the search for a medium sized strain of turkeys with a rapid growth rate, it has been found that the rate of growth is highly associated with the mature body weight of the bird.

DRESSING AND HOLDING POULTRY MEAT

Research on dressing temperatures for broilers that are eviscerated and quick-frozen immediately following dressing and chilling has shown that the water temperature can be increased from the conventional 127°-130°F. to 140°F. without harming the appearance, flavor, or quality of the poultry. The higher temperature permits the removal of almost all feathers including pin feathers by mechanical methods which reduces the cost and yields a more attractive product for the frozen pack. The epidermal layer of skin is removed in the process which results in a lighter colored bird that consumers prefer. The process is called sub-scald; birds are immersed for 30 seconds at 140°F. Poultry dressed by the sub-scald method must be wrapped in moisture-proof material to protect it from drying out. The loss of the epidermal layer of skin is conducive to rapid drying.

In addition, the problem of water absorption by the dressed bird during the cooling process has been studied. It has long been the general belief in the poultry industry that higher dressing temperatures cause the bird to absorb more water. This belief is based primarily on the fact that hard-scalded and "plumped" birds (dipping in boiling water) expand during the scalding process and produce a somewhat expanded or puffed-up appearance. Research has proved this to be untrue. Water absorption through the skin is greater in the birds that have been dressed at temperatures below the 140°-150°F. range. Somewhere in this range, the protein in the outer cells coagulates and either expands or otherwise becomes more resistant to water penetration. The flesh of the hard-scalded birds expands and remains in this condition as long as the birds remain edible, whether they are hard-frozen, air-chilled, or immersed in ice water.

However, when the temperature is raised too high or the birds immersed too long, they take on the appearance of a hard-scald produce and break down in the market channels much faster than they would if processed by the sub-scald method.

Researchers also want to establish more accurately the temperature figures where the protein of the skin starts to coagulate in birds of different weights and types.

OTHER STUDIES

Considerable work has been done on the effects of temperature on chicken eggs held in cases, the lethal embryo temperature, and the lethal body temperature for chickens. Holding chicken eggs in cases for one day at 20°F. reduced hatchability the first day and each succeeding day until after 4 days of storage no eggs would hatch. Holding turkey eggs for 2 days at 20°F. reduced hatchability slightly.

Three thousand eggs at various stages of incubation were tested to find the low and high lethal embryo temperature. The temperature in the body cavity of the unhatched chicken at the center of the egg was measured with thermocouples. Records were made of the internal temperatures at which death occured. When eggs had been exposed to 10°F. for about 55 minutes, their internal temperature reached 29°F. Then the eggs started to freeze and the internal temperature remained relatively constant for

about 65 minutes before approaching the temperature of the environment.

Time played a very important part in the low lethal temperature for the embryo. The low lethal temperature varied from 29°-30°F. with the exposure time ranging from 70 to 95 minutes. The developing embryo appeared to be most resistant during the early part of the incubation period, since at this time the lethal temperature was 29° and the total exposure time was 95 minutes. Indications are that the embryo is less resistant to cold temperatures after the eighth day.

It has been demonstrated that many hatching eggs that are now rejected by hatchery operators because of severe chilling may be incubated satisfactorily. The lethal high temperature for eggs ranged from 106°-119°F.; in general, it increased as the incubation progressed.

The lethal internal body temperature was determined for approximately 920 chickens ranging in age from one day old to maturity. The average low lethal body temperature for chickens was found to be 60°F. on the day of hatching. It increased progressively to 72°F for mature birds. The high lethal temperature ranged from 116°-117°F. for all age groups.

Rural Sociology

RESEARCH WORKERS in rural sociology have been studying the reading interests and preferences, population characteristics, and levels of living of the rural people in Prince George's County so they can provide a basis for library planning. These are pilot experiments for similar studies in other counties with the same problem.

Neighborhood and community information is being used as the basis for locating main and branch libraries as well as stops for the county bookmobile. It was found that after the first year of bookmobile service, 11 percent of the county residents were using the books it carried.

Several areas of rural research are being investigated to discover the possibilities of doing more intensive studies. One of the chief areas of activity concerns the manpower problems in the State of Maryland. All county agents are being visited to secure their judgment on and their experience with problems dealing with manpower. The ultimate purpose of the visit is to assist in formulating an overall state policy that will most effectively define the role of extension in rendering assistance to the farm labor agencies and the draft boards. Special attention is also being given to problems of community organization that develop as a consequence of war emergency programs.

Soil Conservation Research

Report on cooperative projects between the U. S. Department of Agriculture, Soil Conservation Service, Division of Research, and the Maryland Agricultural Experiment Station, College Park, Maryland, for the year ending June 30, 1950.

RIDGE ROWS VERSUS FLAT ROWS

Tests to compare ridge row culture with standard tobacco culture showed no significant difference in yield or value between the two types of culture. The 1949 crop season was unusually dry; only 7 inches of rain fell during the 85-day growing season. All conditions other than the method of cultivation were the same in all 18 plots. In contrast to these results, the 1948 results showed a marked difference in favor of the ridged rows compared with flat rows. Perhaps this year's results were due to the unusually dry weather.

ORGANIC MATERIALS

In tests to find the best materials for heavy organic residues, the delayed plowing continued to give outstanding yields of high quality tobacco. Tobacco yields and values were unusually good, considering that the crop was grown with only 7 inches of rainfall. Tobacco grown following early or normal turning under of vetch grown in mixtures with wheat, rye or ryegrass gave an increase of $250 per acre compared with tobacco grown following no cover. By turning these same cover crops under one month later, another $150 per acre was added to the value of the tobacco crop.

Ryegrass alone gave only a moderate increase in crop yield and value over no cover crop. Late turning of the ryegrass caused some reduction in crop yield and total value. Vetch alone greatly increased the crop yield when turned under late; however, the quality of the tobacco was poor. Vetch grown in mixtures with wheat, rye, or ryegrass gave heavy yields of high quality tobacco. Late turning of these mixtures gave better yields, but in some cases the quality was slightly poorer. The quality may have been hurt by having too much vetch in the mixture.

Planting and cultivating with machinery has often been difficult following late turning of this course organic matter. During the 1950 season all plots with heavy green manure crops were disced thoroughly with a weighted disc before plowing. The cutting and mixing eliminated most of the objectionable features of coarse organic matter. All machine planting and cultivation was done with good results.

STUDIES OF CROP ROTATIONS WITH TOBACCO

Much heavier crops of tobacco were grown following sod than where tobacco followed tobacco during the dry season of 1949. This result was noted in a rearrangement of three-year tobacco rotations. On five plots, tobacco following one or two years of good clover-grass sod produced an average of 1,625 pounds of tobacco valued at $906, while four plots of tobacco following tobacco produced an average of 1,001 pounds of tobacco valued at $575.

STUDIES OF SUPPLEMENTAL IRRIGATION WITH TOBACCO

Supplemental irrigation, at three different rates of application, did not significantly improve the weight or sale value of the tobacco crop compared with only 7.4 inches of rainfall. Two of the three rates of water application gave better quality tobacco leaves as judged by burn tests. These plots were on deep soil in good physical condition, and the yields were heavy under all treatments. Severe wilting in the heat of the day was noted on all unwatered tobacco, but under the conditions of this test, no damage was apparent. Toward the end of the growing season, the tip leaves of a large percentage of plants under all treatments showed mild nutrient deficiency symptoms. Thus, the nutrient supply of the particular soil may have been exhausted with the tobacco growth that occurred under 7.4 inches of rain.

FARM TRIALS

Three farmers cooperated in farm trials to test the use of ridge rows combined with terraces and waterways to control erosion in tobacco fields. Several hard rains during the 1950 season caused very servere damage to unprotected tobacco fields throughout the area. One cooperator said that he grew as much tobacco last year on 6 ridged acres as he would have grown on 20 acres using his old method of cultivation without any erosion protection.

ROADSIDE EROSION

Good progress is being made on methods of controlling erosion on the subsoil of roadside cuts and fills in the Brighton Dam watershed. These studies are giving good information on plants and methods and, at the same time, have considerably reduced the amount of silt being washed into the reservoir. Common Kudzu appears to be establishing and growing much better where pine boughs or small pine trees are used as a mulch protection. On the steep droughty slopes, the pine boughs keep the plants from being washed out or covered during heavy rains and conserve moisture during dry periods.

Publications

BULLETINS

Number	Title	Author
A52	Marketing of Hatching Chicks and Broilers in the Del-Mar-Va Area.	H. D. Smith P. R. Poffenberger S. H. DeVault
A53	Research Leads the Way to Agricultural Progress . . . 62nd Annual Report.	W. B. Kemp
A54	Farm Insurance in Maryland.	P. R. Poffenberger J. C. Bouma
A55	Farm Practices Influencing Egg Quality.	H. D. Smith

SCIENTIFIC JOURNAL ARTICLES

Number	Title	Author
A246	The Influence of Altered Metabolism Upon Fertility and Hatchability in the Female Fowl.	M. G. McCartney C. S. Shaffner
A247	Blood Volume Determinations in Chickens. *Poultry Science.*	G. W. Newell C. S. Shaffner
A248	Folic Acid in Poultry Nutrition. II. Effect of Maternal Diet and Chick Diet Upon Mortality, Growth and Feathering of Progeny. *Poultry Science.*	R. J. Lillie G. F. Combs G. M. Briggs
A249	Folic Acid in Poultry Nutrition. I. The Critical Need for Folic Acid by Laying Pullets. *Poultry Science.*	R. J. Lillie G. F. Combs G. M. Briggs
A250	The Ineffectiveness of Modified Thyroidal Activity on Resistance of Chickens to Fowl Cholera. *Cornell Veterinarian.*	R. E. Moreng C. S. Shaffner
A251	Investigations of Meadow Nematodes, *Pratylenchus spp.* Attacking Boxwood, and the Therapeutic Value of Sodium Selenate as a Control. *Phytopathology.*	A. C. Tarjan
A252	A Comparison of Quality Factors of Black Raspberry Varieties as Fresh and Frozen Products. *Food Research.*	I. C. Haut R. G. Hill, Jr.
A253	Growth and Yield Responses of the Temple Strawberry as Influenced by Plant Spacing, Width of Row, and Renewal Systems. *Proceedings of American Society of Horticultural Science.*	R. G. Hill, Jr. I. C. Haut
A254	Factors Affecting the Objective and Organoleptic Evaluation of Quality in Raw and Canned Peas. *Food Technology.*	A. Kramer L. E. Scott R. B. Guyer

Number	Title	Author
A255	Blood Loss by Chickens During Killing. *Poultry Science.*	G. W. Newell C. S. Shaffner
A256	Thyroid Weight and Function as Influenced by Environmental Temperature. *Poultry Science.*	E. Hoffman C. S. Shaffner
A257	The Effects of Various Degrees of Chilling on Mortality and Growth of Baby Chicks. *Poultry Science.*	R. E. Moreng N. E. Phillips
A258	Preliminary Tests with Seed Treatments in Prohibiting Root-Knot Nematode Infection of Cucumber Seedlings. *Phytopathology.*	A. C. Tarjan J. E. Moore
A259	A Comparison of Sprouts and Vine Cuttings for Sweet Potato Production. *Transactions of the Peninsula Horticultural Society—1949.*	A. A. El-Kattan F. C. Stark, Jr.
A261	Liquefied Gas Aerosols for the Home Gardener. *Journal of Economic Entomology.*	H. B. Owens L. P. Ditman
A262	Experiments with Soil and Foliar Applications of Fertilizer to Cantaloupes. *Transactions of Peninsula Horticultural Society.*	F. C. Stark, Jr. W. A. Matthews
A263	Polembryony in Capsicum Frutescens. *Journal of Heredity.*	D. T. Morgan R. D. Rappleye
A264	A Preliminary Study on the Mineral Nutrition of Hydrangeas. *Proceedings American Society for Horticultural Science.*	J. B. Shanks J. R. Haun C. B. Link
A265	Experiments on the Control of the Corn Earworm and Other Pests of Corn. *Journal of Economic Entomology.*	L. P. Ditman
A266	Potassium Uptake by the Sweet Potato Plants. *Proceedings of the American Society for Horticultural Science.*	L. E. Scott
A267	Effect of Thyroprotein and Caloric Level of Diet on Metabolic Rate of Chickens. *Poultry Science.*	H. Singh C. S. Shaffner
A268	Studies on Ketosis in Dairy Cattle X. The Effect of a Vitamin A Deficiency. *American Journal of Veterinary Medicine.*	J. C. Shaw
A269	Studies on Ketosis in Dairy Cattle. XI. Lipids, Minerals and Ascorbic Acid in the Blood of Cows with Spontaneous Ketosis. *Journal of Dairy Science.*	P. Saarinen J. C. Shaw
A270	Studies of Ketosis in Dairy Cattle XII. Blood Lipids, Phosphates and Phosphatase Activity of Cows on Different Levels of Feed Intake Postpartum. *Journal of Dairy Science.*	P. Saarinen J. C. Shaw
A271	Studies of Ketosis in Dairy Cattle XIII. Lipids and Ascorbic Acid in the Liver and Adrenals of Cows with Spontaneous and Fasting Ketosis. *Journal of Dairy Science.*	P. Saarinen J. C. Shaw

Number	Title	Author
A272	Mineral Deficiency Symptoms of the Temple Strawberry Grown in Sand Culture. *Proceedings of the American Society for Horticulture Science.*	Ben Iwakiri L. E. Scott
A273	Response of Grape Vines to Soil and Spray Applications of Magnesium Sulfate. *Proceedings of American Society for Horticultural Science.*	L. E. Scott D. H. Scott
A274	Pollination Studies on Lilium Regale. E. H. Wils. *The Yearbook of the North American Lily Society Volume III. 1950.*	R. D. Rappleye
A275	Factors Affecting Yield and Quality Measurements of Raw and Canned Green and Wax Beans—A Preliminary Report. *Proceedings of the American Society of Horticultural Science.*	R. B. Guyer A. Kramer
A276	Further Evidence for an Unidentified Growth Factor Required by the Poult. *Poultry Science.*	G. F. Combs C. S. Shaffner
A277	Dried Penicillin Mycelium as a Riboflavin Source in Chick Rations. *Poultry Science.*	J. L. Milligan J. O. Anderson G. F. Combs G. M. Briggs
A278	An Experiment on Fall Army Worm Control. *Journal of Economic Entomology.*	L. P. Ditman
A280	A Comparison of Methods for Determining Color in Canned Tomato Juice. *Food Industries.*	A. Kramer
A281	A Comparison of the Allen Volumetric Blood Fat Procedure with an Extraction Procedure. *Journal of Dairy Science.*	A. C. Chung P. Saarinen J. C. Shaw
A282	The Validity of the Allen Volumetric Procedure for the Determination of Blood Lipids of Cows on Different Feeding Regimes. *Journal of Dairy Science.*	H. K. Lo P. Saarinen J. C. Shaw
A283	The Adequacy of an All Alfalfa Hay Ration for Milk Secretion. *Journal of Dairy Science.*	P. Saarinen M. A. Sami J. C. Shaw
A284	A Comparative Study of Three Methods of Determining the Heat Destruction of Lactose in Milk with Special Reference to the Picric Acid Colorimetric Procedure. *Journal of Dairy Science.*	P. B. Larsen I. A. Gould
A285	The Action of Mutant Chondriogenes and Viruses on Plant Cells with Special Reference to the Plastids. *American Journal of Botany.*	M. W. Woods H. G. DuBuy
A286	Niacin Replacing Value of L- and DL-Tryptophan in Chick Diets as Influenced by Carbohydrate Source. *Journal of Nutrition.*	J. O. Anderson G. F. Combs G. M. Briggs

MISCELLANEOUS PERIODICALS, REPORTS, PROCEEDINGS, ETC.

Number	Title	Author
91	Relationship of Production Factors to Out-of-Pocket Broiler Costs and Profits. *Mimeographed Circular.*	H. D. Smith P. R. Poffenberger S. H. DeVault
92	Factors Associated with Cracking of Sweet Potatoes. *Transactions of the Peninsula Horticultural Society.*	L. E. Scott
93	Determining Orchard Fertilizer Needs by Leaf Analysis. *Transactions of the Peninsula Horticultural Society.*	L. E. Scott
94	Preliminary Studies of Peach Brown Rot Cankers in Maryland. *Transactions of the Peninsula Horticultural Society.*	L. O. Weaver
95	A Consideration of Mineral Nutrition of Boxwood in Relation to Infection by Meadow Nematodes, *Pratylenchus spp.* *Phytopathology.*	A. C. Tarjan
96	Percent Soluble Solids in Cantaloupe Increased by Spraying with Mineral Salts. *The Extension News.*	Francis C. Stark, Jr.
97	The Performance of Hybrid Corn in 1949. *Planographed Circular.*	R. G. Rothgeb
98	Sweet Corn Field Trials of 1949. *Mimeographed Circular.*	R. G. Rothgeb

Current Projects

AGRICULTURAL ECONOMICS

(*These are projects and not publications available to the public.*)

Project No.	
A–18–x	Father-Son Partnership Arrangements in Maryland.
A–18–aa	Insurance Coverage Carried by Farmers.
A–18–ab	Economics of Soil Conservation in the Harford County Soil Conservation District of Maryland.
A–18–ac	Farming Alternatives in Major Competing Potato Areas.
A–18–ad	Factors Affecting Efficiency in Milk Production.
A–19–h	Status and Improvement Needs of Local Rural Roads in Maryland.
A–19–i	Improving Farm building Assessments for Tax Purposes.
A–19–j	Sales Taxes and Their Application to Farmers.
A–19–k	Recent Tax Changes in Maryland and Their Effect on Farmers' Tax Obligations.
A–19–l	Financial Status and Security of Farmers.
A–26–l	Prices Paid by Farmers for Commodities Bought.
A–26–o	Marketing of Hatching Eggs and Broilers on the Del-Mar-Va Peninsula.

A-26-p Economic Aspects of Marketing Fresh Fruits and Vegetables in Consumer Packages.
A-26-q Marketing Premium Sweet Corn Direct from Grower to Retailer.
A-26-r Retail Merchandising Practices and Display Methods.
A-26-s Experimental Marketing of Local Products.
A-26-t Seasonal and Supplementary Supply Sources and Variations in the Major Fluid Milksheds of Maryland.
A-26-v Effect of Methods of Marketing Eggs on Quality During the Summer Months.
A-26-w Increased Consumption of, and Lower Marketing Costs for Apples and Peaches Through Adoption of Better Distribution Practices.
A-26-y Pricing Policies for Fruits and Vegetables in Retail Stores.
A-32-f Farm Tenancy and Leasing Arrangements in Maryland.
A-32-h The Effect of Drainage Upon Crop Yields, Farming Practices and Land Utilization.

AGRICULTURAL ENGINEERING

Project No.

H-46-a Concentrated Sprays. The Development of Liquefied Gas Insecticide Aerosols and Machinery for their Application. (In cooperation with Entomology.)
R-10 Drying Hay with Heated Air.
R-11-a Field Harvesting of Tobacco.
R-11-b Handling Tobacco in the Barn.
R-11-c Mechanization of Tobacco Production.
R-11-d Tobacco Housing.
R-11-e Structures and Equipment for Tobacco Stripping.
R-12 Drying Ear Corn with Natural Air in Maryland.
R-13 Development of Equipment for Field Application of Insecticides to Canning Corn for Control of the European Corn Borer.
R-14 Mow Curing Hay in Maryland.

AGRONOMY

Project No.

B-39 Wheat Hybridization and Selection.
B-41 Barley Hybridization for Smooth Awns.
B-43 Soybean Production in Maryland.
B-44 Sweet Corn Seed Production and Breeding.
B-50 Development of Dent Corn Hybrids Specifically Adapted to the Corn-Growing Areas of Maryland.
B-52 Effects of Different Short Rotations on Physical, Chemical and Pathological Conditions in the Soil and on Crop Production.
B-53 Curing of Maryland Tobacco.
B-56 Improvement of Forage for Pasture, Hay and Grass Silage in Maryland.
B-56-a Improvement of Red Clover Adapted to Maryland.
B-56-b Pasture Renovation Studies.
B-56-c Management of Medium Red Clover Stands After Combined Wheat.
B-56-d Alfalfa Strain and Variety Evaluation.

B-56-e	Red Clover Strain and Variety Evaluation.
B-56-f	The Evaluation of Forage Crop Varieties and Strains for their Use and Adaptation in Maryland.
B-56-g	Development and Maintenance of Superior Ladino Clover Breeding Material.
B-56-h	Survey of Pasture Conditions in Maryland.
B-56-i	Development of Superior Orchard Grass Strains for Use in Maryland.
B-57	The Improvement, Production and Use of Rye in Maryland.
B-58	Chemical Weed Control in Field Crops.
B-58-a	Control of Weeds in Corn by the Use of 2,4-D Preparations.
B-59	Improvement in Plant Bed Management for Maryland Tobacco.
B-60	Study of Placement of Fertilizers for Maryland Tobacco.
O-27	Field Studies of the Fertility Requirements and Management of Important Soil Types in Maryland.
O-28-b	A Study of the Formula and Analysis for Late Potatoes.
O-33	Efficiency of Soil Fertility Management.
O-43	Hydrologic Studies with Reference to Soil Moisture Conservation, Soil Fertility and Flood Control.
O-44	A Bio-Chemical Biological Study of Means to Increase the Organic Colloidal Complex of the Soil.
O-44-a	A Study of the Chemical and Physical Changes Produced in a Soil by the Formation of the Organic Colloidal Complex.
O-45-a	Soil Fertility Studies at the University Farms. (Influence of Various Fertilizer Ratios).
O-45-b	A Study of the Availability of Phosphate Material.
O-47	The Available Supplies and Relative Agricultural Values of By-Product Liming Materials of Eastern Maryland.
O-47-a	A Study of the Lime Needs and Reactions in Maryland Soils.
O-47-b	A Study of Neutralization Value of Slag for Maryland Soils.
O-48	A Study of the Reclassification of Soils and the Adaptation of these Classes to Soil Conservation Work in Maryland.
O-49	A Study of the Effect of Fertilizer, Boron, Minor Elements on the Stand, Yield and Composition of Alfalfa.

AGRONOMY—SEED INSPECTION

Project No.	
N-7	Inspection of Seeds Sold Throughout the State.
N-8	Examination of Samples from Seeds Sold Throughout the State.
N-9	Examination of Samples Submitted to the Laboratory.

ANIMAL HUSBANDRY

Project No.	
C-6	Study of the Factors Which Influence the Production of Cured Pork Products of Desirable Quality and Palatability.
C-8	Swine Breeding Investigations Within the State of Maryland.
C-14	A Study of the Productiveness of Purebred Beef Cattle in Maryland.
C-14-a	Effect of Early Weaning on the Duration of Maternal Influences in Beef Calves.
C-14-b	Type Classification as an Aid in Selection of Beef Breeding Cattle.

C-15 Influence of Diet on Ketosis in Sheep.
C-16 Histological Study of the Development of the Testes of the Ram.
C-17 Effect of New Feeding and Management Practices on Market Classification and Consumer Desirability of Farm Animals and Their Products.
C-18 A Study of the Causes and Prevention of Bloat in Beef Cattle on Pasture.

ANIMAL PATHOLOGY

Project No.

D-46 Bang's Disease—Calfhood Vaccination.
D-48 The Formulation of a Control Program Against Fowl Cholera.
D-50 Anaplasmosis of Cattle.
D-51 Experiments with Infections Enterohepatitis (Blackhead) of Turkeys.
D-52 Field Trials in Immunization Against Newcastle Disease with Inactivated and Modified Virus Vaccines.
D-53 Role of Disturbances in the Acid-Base Balance in the Parturient Cow and Their Significance in the Cause of Milk Fever and Ketosis. (Acetonemia).
D-54 A Study of the Infectious Bovine Mastitis: Its Control and Eradication and the Economic Losses Attending.

BOTANY

Project No.

F-9 Cytogenetic Studies in the Genera Ipomoea, Gladiolus and Tulipa.
F-12 The Native Plants of Maryland, Their Occurrence, Distribution and Economic Importance.
F-15-a Heterosis in Hybrids from Homozygous Pepper Lines Obtained from Haploid Plants.
J-72 Potato Improvement and Disease Control.
J-78-a Breeding Strawberries for Resistance to the Red Stele Disease Caused by *Phytophthora fragariae* Hickman.
J-80-a Disease Resistance in Potatoes with Special Reference to Wilt and Late Blight.
J-85 The Effect of Hormone and Chemical Treatments on Breaking the Rest Period of Seed Potatoes.
J-86-a Methods of Controlling Diseases Affecting Commercial Production of Sweet Potatoes in Maryland.
J-87 Treatments for Control of Seed and Soil-Borne Diseases of Vegetable Crops.
J-88 Development of Identification and Control Procedures for Plant Virus Diseases in Maryland.
K-7 Physiological and Biochemical Aspects of Vegetable Storage.
K-8-a Relationship of Boron to the Flowering and Fruiting of Plants.
K-8-b A Determination of the Concentrations of Various Inorganic and Organic Components Coincident with Maximal Yields of Certain Crop Plants in Maryland.

DAIRY HUSBANDRY

Project No.

G-27-a The Effect of Certain Feed Stuffs Upon the Vitamin A Requirements of Dairy Cattle.

G-34 Chemical Changes in Milk Fat as Related to the Flavor of the Milk.

G-35 The Analysis of Dairy Products.

G-37 The Feeding and Management of the Cow During the Dry and Freshening Period.

G-38 The Fat Metabolism of the Mammary Gland.

G-39 Factors that Affect the Availability of Nutrients in Feeds and Their Influence Upon Blood Composition and Milk Secretion.

G-40 The Influence of High Temperature Heat Treatments on Certain Physical Chemical Properties of Milk.

G-41 The Effect of Feeding High Energy Diets During the Freshening Period.

ENTOMOLOGY

Project No.

H-29 Investigations of the Biology and Control of Insects Affecting Canning Crops. *Sub. 6.* The Pea Aphid. Insecticidal Control and Timing Treatments.

H-29 *Sub. G.* Insecticidal Control of the Mexican Bean Beetle.

H-35 Nursery Insects.

H-40 Biology and Control of Tobacco Insects.
Sub. I. The Tobacco Horn Worms.

H-41 Biology and Control of the Japanese Beetle.

H-43 The Biology and Control of the European Corn Borer Under Maryland Conditions.

H-46-a Concentrated Sprays. The Development of Liquefied Gas Insecticide Aerosols and Machinery for Their Application.

H-46-b Concentrated Sprays. Combined Insecticidal and Fungicidal Aerosols.

H-48 The Codling Moth.

H-50 The Biology and Control of the Pests of Commercial Floriculture.

H-52 The Effect of Various Formulations of DDT on Plant and Animal Development.

H-51 The Effect of DDT on Aquatic Life.

H-54 A Monographic Study of the Coccid Family *Aclerdidae* (order Homoptera).

H-55-a The Control of Insects Attacking Peach Foliage and Fruit.

H-55-b Control of the Peach Tree Borer.

H-56 Patuxent Project on the Effect of Soil Conservation Upon Insect Populations.

HORTICULTURE

Project No.	
I–26–a	Rooting of Ornamental Plants Difficult to Propagate.
I–58–a	A Physiological Study of the Keeping Qualities of Cut Flowers as Influenced by Packaging.
I–74–a	Effect of Environmental Factors and Cultural Practices on the Growth and Flowering of Hydrangeas and Azaleas.
I–79–a	The Mineral Nutrient Requirements of the Azalea.
I–79–b	The Mineral Nutrition of the Hydrangea.
L–68	Factors Affecting Maturity, Shipping and Storage Quality of Fruits.
L–72	Relation of Soil Moisture, Age of Plants, Size of Plants, Spacing of Plants and Use of Mineral Nutrients to Flower Differentiation, Fruit Yield and Quality of the Strawberry.
L–73	Adaptation of Fruit Varieties and New Seedlings to Maryland.
L–74	Environmental Factors and Cultural Practices in Relation to the Growth and Fruiting Responses of Fruits.
L–74–a	Relation of Environmental and Soil Factors to the Cracking of Sweet Potatoes.
Q–58–b	Grading Raw Products.
Q–58–d	Quality of Frozen Vegetables and Fruits as Influenced by Methods of Handling Raw Stock, Processing, Storage and Utilization.
Q–58–f	Methods of Determining and Preserving Quality Including Nutritional Values, Palatability and Attractiveness in Fresh and Processed Vegetables and Avoiding Wastage During the Various Marketing Processes.
Q–67	The Value of Organic Matter in the Production of Vegetable Crops.
Q–74	A Study of Regional Adaptation of Certain Vegetable Crops and Varieties in Maryland.
Q–77	Crop Management Studies with Vegetable Crops.
Q–79–b	The Mineral Levels and Interrelationships of Mineral Nutrients in Fruit Plantings of Maryland.
Q–79–c	Influence of Nutrient Intensity and Balance on the Quality and Physiological Defoliation of Cantaloupes.
Q–80	Basic Physiological Studies on the Quality of Fresh Vegetables as Modified by Various Factors During Harvesting, Preparation for Market and Storage.
Q–81	Cantaloupe Breeding and Selection with Particular Reference to Quality and Resistance to Defoliation.
Q–82	Tomato Breeding and Selection with Particular Reference to Greater Resistance to Cracking and to Late Blight.

POULTRY

M–32–h	Hatchability Studies in Poultry.
M–32–k	Differences in Thyroid Activity as Related to Strain Differences in Growth, Feed Utilization and Feathering.
M–33–f	Changes in Grades of Eggs in Carlot Shipments in Relation to Season, Shipping Distance, Temperature, Time and Other Factors.
M–33–h	Hormonal Control of Economic Traits in Poultry.
M–33–i	Development of a Flightless Strain of New Hampshire Chickens.
M–33–j	Semen Studies with Chickens and Turkeys.
M–34–e	Medium Sized Strain of Turkeys with Certain Desirable Qualities.

M-35-g The Requirement of the Growing Chick for Newer Members of the Vitamin B Complex.
M-35-i Amino Acids in Poultry Nutrition.
M-35-j Energy Value in Relation to Fiber Content in Poultry Rations.
M-35-k Unidentified Growth Factors for Chickens and Bacteria.
M-36-e The Role of Wheat in Pullet Disease of Chickens.
M-43-b Determining Feather Genotype Through Hormone Effects in Lieu of Breeding.
M-44 The Influence of Methods of Dressing and Holding on the Quality of Poultry Meat.

SOCIOLOGY

S-1 Community and Population Bases in Planning County Library Services.

Changes in Personnel

Appointments

W. S. Arbuckle, Ph.D., Professor, Dairy Husbandry, August 16, 1949
W. A. Bickley, Ph.D., Associate Professor, Entomology, September 1, 1949
A. W. Burger, Ph.D., Associate Professor, Agronomy, February 1, 1950
A. A. Duncan, B.S., Research Assistant, Horticulture, May 16, 1950
J. C. Evans, B.S., Associate Professor, Information & Publications, February 6, 1950
J. F. Mattick, Ph.D., Assistant Professor, Dairy Husbandry, December 1, 1949
J. L. Newcomer, B.S., Instructor, Agronomy, June 1, 1950
Mary S. Shorb, Ph.D., Professor, Poultry Husbandry, January 1, 1950
W. T. Sigafoose, B.S., Research Assistant, Agricultural Economics, July 1, 1950

Resignations

G. H. Axinn, B.S., Associate Professor, Information & Publications, November 15, 1949
B. C. Johnson, B.S., Instructor, Dairy Husbandry, September 15, 1949
E. E. Miller, M.S., Research Assistant, Agricultural Economics, July 1, 1949
F. G. Warren, Ph.D., Associate Professor, Dairy Husbandry, November 15, 1949

Station Staff

W. B. Kemp, Director

AGRICULTURAL ECONOMICS

S. H. DeVault, Ph.D., Prof. and Head of Dept.
G. M. Beal, Ph.D., Professor, Agr. Econ.
L. B. Bohanan, M. S., Asst. Prof. Agr. Econ.
A. B. Hamilton, M.S., Assoc. Prof. Agr. Econ.
P. R. Poffenberger, M.S., Assoc. Prof. Agr. Econ.
S. C. Shull, M.S., Assoc. Prof. Agr. Econ.
W. T. Sigafoose, B.S., Res. Asst.
H. D. Smith, M.S., Asst. Prof. Agr. Econ.
W. P. Walker, M.S., Assoc. Prof. Agr. Econ.

AGRICULTURAL EDUCATION

A. M. Ahalt, M.S., Prof. and Head of Dept.
R. A. Murray, Ph.D., Assoc. Prof.

AGRICULTURAL ENGINEERING

R. W. Carpenter, A.B., LL.B., Prof. and Head of Dept.
G. J. Burkhardt, M.S., Assoc. Prof. Agr. Engr.
H. J. Hoffmeister, B.S., Asst. Prof. Agr. Engr.
A. V. Krewatch, M.S., Assoc. Prof. Agr. Engr.
P. N. Winn, Jr., B.S., Asst. Prof. Agr. Engr.

AGRONOMY

A. O. Kuhn, Ph.D., Prof. and Head of Dept.
J. H. Axley, Ph.D., Assoc. Prof. Soils
B. B. Barger, B.S., Asst. Tobacco
A. W. Burger, Ph.D., Assoc. Prof.
L. E. Hogue, B.S., Instr. Agron.
C. H. Liden, M.S., Asst. Prof. Agron.
J. L. Newcomer, B.S., Instr.
W. B. Posey, M.S., Prof. Tobacco
T. S. Ronningen, Ph.D., Asst. Prof. Agron.
R. G. Rothgeb, Ph.D., Prof. Agron.
O. E. Street, Ph.D., Assoc. Prof. Tobacco
R. P. Thomas, Ph.D., Prof. Soils
H. B. Winant, M.S., Asst. Prof. Soils

ANIMAL HUSBANDRY

J. E. Foster, Ph.D., Prof. and Head of Dept.
John Burie, B.S., Instr. Animal Husbandry
W. W. Green, Ph.D., Prof. Animal Husb.
M. H. Kerr, M.S., Assoc. Prof. Animal Husb.
J. B. Outhouse, M.S., Assoc. Prof. Animal Husb.

ANIMAL PATHOLOGY

A. L. Brueckner, B.S., D.V.M., Prof. and Head of Dept.
Cornelia M. Cotton, Ph.D., Coop. Agent
H. M. DeVolt, M.S., D.V.M., Prof. Path.
L. J. Poelma, M.S., D.V.M., Prof. Path.
R. E. Swope, V.M.D., Assoc. Prof.

BOTANY

Ronald Bamford, Ph.D., Prof. and Head of Dept.
R. G. Brown, Ph.D., Assoc. Prof. Bot.
Virginia H. Corp., B.S., Instr.
C. E. Cox, Ph.D., Assoc. Prof. Plt. Path.
H. G. Gauch, Ph.D., Assoc. Prof. Plt. Phys.
W. F. Jeffers, Ph.D., Prof. Plt. Path.
R. A. Jehle, Ph.D., Prof. Plt. Path.
J. E. Moore, B.S., Instr. Plt. Path.
D. T. Morgan, Jr., Ph.D., Asst. Prof. Botany
O. D. Morgan, Ph.D., Asst. Prof.
R. D. Rappleye, Ph.D., Instr. Botany
L. O. Weaver, Ph.D., Asst. Prof. Botany

DAIRY HUSBANDRY

G. M. Cairns, Ph.D., Prof. and Head of Dept.
W. S. Arbuckle, Ph.D., Professor
M. F. Ellmore, B.S., Instr. Dairy Husb.
J. O. Hall, Jr., B.S., Asst. Insp. Dairy Husb.
B. C. Johnson, B.S., Instr. Dairy Mfg.
J. F. Mattick, Ph.D., Asst. Prof.
V. P. Saarinen, Ph.D., Visiting Prof., Dairy Husb.
J. C. Shaw, Ph.D., Prof. Dairy Husb.

EDITORIAL

A. E. Durfee, M.S., Prof. and Editor
J. C. Evans, B.S., Assoc. Prof.

ENTOMOLOGY

E. N. Cory, Ph.D., Prof. and Head of Dept.
G. J. Abrams, M.S., Asst. Prof. Apiculture
W. A. Bickley, Ph.D., Assoc. Prof.
L. P. Ditman, Ph.D., Assoc. Prof. Ent.
J. R. Foster, M.S., Instr.
Elizabeth Haviland, Ph.D., Asst. Prof.
H. S. McConnell, M.S., Assoc. Prof. Ent.

HORTICULTURE

I. C. Haut, Ph.D., Prof. and Head of Dept.
J. S. Caldwell, Ph.D., Assoc. Prof.
P. W. Cornell, M.S., Assoc. Prof. Flor.
A. A. Duncan, B.S., Res. Asst., Hort.
J. E. Hawes, M.S., Asst. Hort.
Amihud Kramer, Ph.D., Prof. Hort.
C. B. Link, Ph.D., Prof. Flor.
W. A. Matthews, M.S., Assoc. Prof.
A. L. Schrader, Ph.D., Prof. Pomol.
L. E. Scott, Ph.D., Prof. Physiol.
J. B. Shanks, Ph.D., Assoc. Prof.
F. C. Stark, Ph.D., Assoc. Prof.
S. H. Todd, B.S., Asst. Hort.
E. P. Walls, Ph.D., Prof. Canning Crops

POULTRY

M. A. Jull, Ph.D., Prof. and Head of Dept.
G. F. Combs, Ph.D., Prof. Poult. Nutrition
J. M. Gwin, Ph.D., Prof. Poult. and Mar.
Mary Juhn, Ph.D., Res. Prof.
G. D. Quigley, B.S., Assoc. Prof. Poult. Husb.
C. S. Shaffner, Ph.D., Prof. Poult. Husb.
Mary Shorb, Ph.D., Prof.

SEED INSPECTION

F. S. Holmes, M.S., Chief Seed Inspector

Financial Statement - July 1, 1949 to June 30, 1950

FEDERAL FUNDS

	Hatch	Adams	Purnell	Bankhead-Jones	Research Marketing 9b1-9b2	Research Marketing 9b3	Research Marketing Title II	
Balance June 30, 1949	$ 133.42		$ 20.73		$ 1,503.25	$ 1,449.79		
Appropriation 1949–50	14,866.58	$15,000.00	59,979.27	$35,303.01	46,055.54	13,850.00	$ 2,600.00	
	$15,000.00	$15,000.00	$60,000.00	$37,303.01	$47,558.79	$15,299.79	$ 2,600.00	
Receipts from sources other than Federal 1949-50								**For Agr. Investigations***
State Appropriations for Agricultural Investigations								$281,217.00
Industrial Grants								55,317.07
Sales and Miscellaneous								76,416.58
								$412,950.65
Balance brought forward July 1, 1949								70,659.89
Total								$483,610.54
Expenditures:								
Personal Services	$ 7,556.22	$11,468.00	$50,479.22	$23,446.42	$36,989.93	$ 5,839.87	$ 2,399.46	$241,700.86
Travel	2,878.63	23.41	1,498.82	136.29	1,330.17	1,055.11	75.35	16,146.80
Transportation	1.13	13.18	28.49	150.27	75.49	31.24		359.97
Communication Services	34.29	13.80	77.37	80.35	31.75			1,289.93
Rents and Utility Services	33.15		65.45	144.43	36.53	250.00		735.02
Printing and Binding	100.00		31.45	112.60	2.92	374.69		2,121.48
Other Contractual Services	1,723.65	46.50	515.83	121.47	376.15	790.36	23.04	16,108.60
Supplies and Materials	1,739.29	2,143.19	5,685.78	9,605.67	3,322.74	3,505.58		71,193.25
Equipment	933.64	1,291.92	1,617.59	1,500.24	1,442.28	2,492.74		24,625.93
Land and Structures								8,393.57
Contributions to Retirement								
	$15,000.00	$15,000.00	$60,000.00	$35,297.74	$43,607.96	$14,339.59	$ 2,497.85	$382,675.41
Balances June 30, 1950				5.27	3,950.83	960.20	102.15	100,935.13
Totals	$15,000.00	$15,000.00	$60,000.00	$35,303.01	$47,558.79	$15,299.79	$ 2,600.00	$483,610.54

* Including Bankhead-Jones Offset Funds.

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